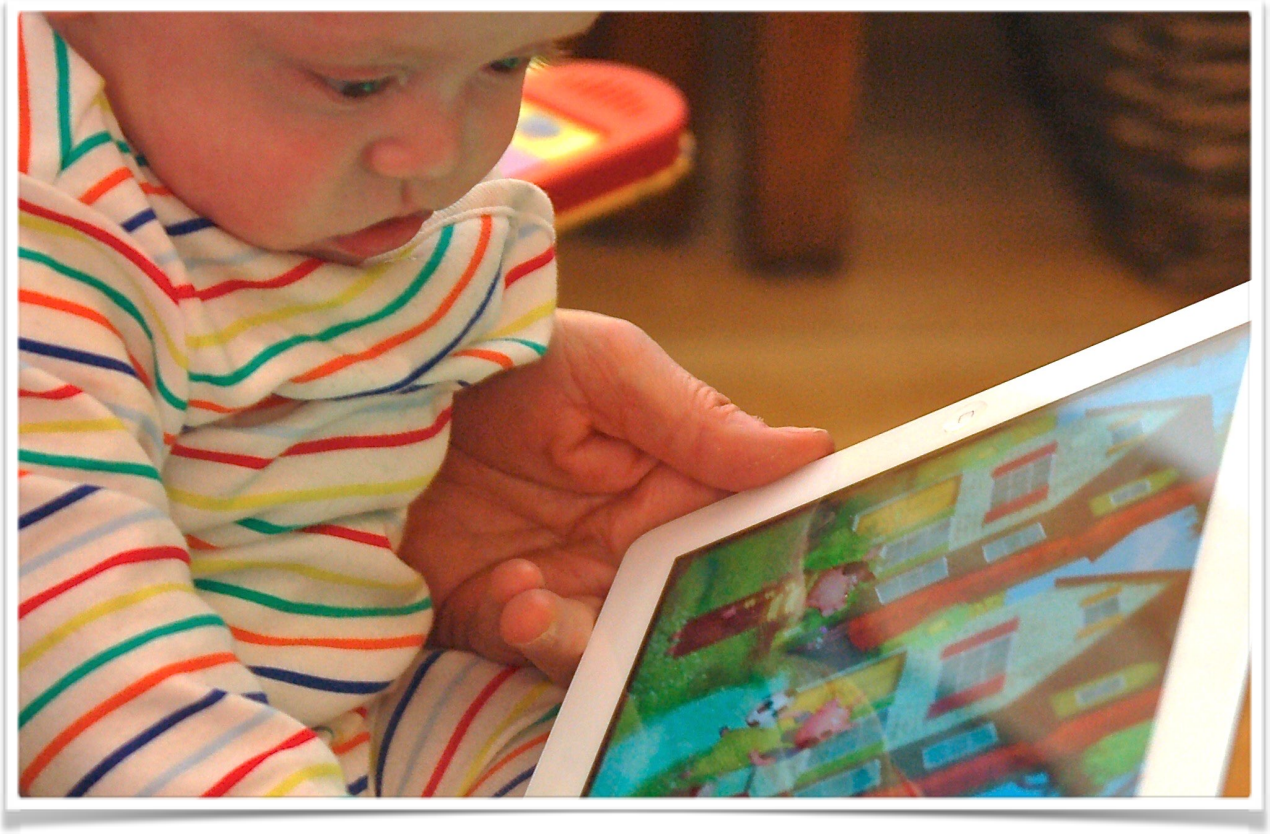
Establishing a Research Agenda for the Digital Literacy Practices of Young Children

A White Paper for COST Action IS1410



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Introduction

This paper outlines the context and research questions behind a Europe-wide project investigating young children, digital technologies and changing literacies.

All the claims made for the “digital generation” keep on being recalibrated. First of all, the digital generation grew up with games consoles, then it was the Internet and subsequently the smart phone. Whilst each new phase of technological innovation might seem to set a new standard in what it means to be "born digital”, and no doubt this will continue to change with the "Internet of things", we are now entering a period where the parents of children born today might themselves very much come from a generation that itself had been labelled, digital.

There are important gaps and inconsistencies, structural inequalities and important divergences in any sense of wholesale change across the countries of Europe. Whilst it's true that a child born in any affluent city in Europe in 2015 may come from a family immersed in digital technology, constantly connected to the Internet with every member of the household possessing a smart phone, tablet, with PCs, smart televisions in the home and schools awash with smart boards, 100% Wi-Fi coverage and so forth, we also know they will have classmates with very different experiences of the digital. Poorer families may well only have access to the Internet via a smart phone, of which there may be only one in the household and reliant on precarious pay-as-you-go tariffs. For that child, school may be the portal to the digital century. Nevertheless, we know that families with young children are more likely than families without children to be Internet enabled, that children over the age of eight are more than likely to have their own smart phone, and that the houses where they live will have several ways of accessing the online world with many children using more than one device, be they tablets, consoles or computers. Whilst categorically asserting that this, now, is the digital generation will therefore always require important caveats and disclaimers, we can say that everyday use of digital technologies is the norm. Young children, the subject of our study are, to a hitherto unknown degree, growing up immersed in and surrounded by digital devices and forms of communication right across Europe. What does this mean for everyday life, for learning, for families and for the future?

Yet, digital technology does not determine social relationships: in reality it is the other way round so we ask, and will continue to investigate over the course of our project: in what ways are the literacies of young children being transformed by wider social, technological and economic changes across Europe? In this introductory section we suggest that there are four dimensions of contemporary social life across Europe that have an influence on the place and meaning of the digital in young children's lives. Across each dimension there are a key range of unknowns especially in relation to very young children – 0-8 years' old - who are the focus of our project. It is noticeable how children themselves can exert little agency in some of these although in others they play an active part in constituting modern family life.

First of all, we need to consider structural changes in employment, the constitution of the family as a social unit, migration, and significant changes in the allocation of public housing, all of which create a set of circumstances for parents of young children that in themselves have a great influence on the lives that their children lead. Secondly, we need to examine the specific nature of the technologies and technological change brought about by digitalisation and media convergence. The growth and spread of digital media technologies as well as their changing capabilities seriously enables (or disables) interpersonal, community and individual communication, as well as significantly affecting what it means to be literate and to learn in the 21st-century. Thirdly, we need to consider the cultural construct of childhood and specially how this shift to the digital impacts on how, where and when children grow up to day. Here, we need to think about the ways that society thinks are the right and wrong ways to bring up children, how parenting might be changing, children's rights, and what might constitute a happy and good childhood. And finally, we need to consider the changing nature of public education across the societies of Europe and to reflect on how expectations about the meaning, nature, purpose and values of school are affecting young children of preschool age. Debates about curriculum and pedagogy show how fractured and challenging national visions of schooling are. These four dimensions are central in any investigation of what it might mean to grow up digital in Europe today and lead to a set of questions which will animate our project.

In the rest of this opening section we outline these dimensions in more detail and then, in Section 2 go on to consider in more detail our understanding of literacy – or more precisely literacies – which characterise these changing forms of connection and relationship in which the learning of young children is so deeply embedded. Section 3 then explores how literacies, especially digital competencies, are defined in school curricula and Section 4 concludes by outlining our future research questions in this area.

1.1 Social Change: Families, Employment and Housing

The context in which young children grow up is changing. Even if it never quite existed in the way that it has been portrayed, the paradigm of two parent nuclear hetero-normative family unit still dominates where we imagine children grow up. However, as Deborah Chambers has argued, the concept of a family unit with strict gendered roles based on male employment is no longer a valid way of imagining what the family is today (Chambers, 2012). Chambers suggests that contemporary family life has been "de traditionalised" and "individualised" so that many kinds of what she calls "intimate relationships" now exist in various configurations. Changes in patterns of divorce, access to new and sometimes radical reproductive technologies and open gay and lesbian relationships have all combined to redefine what a family unit now might be. Chambers also notes how the traditional vision of the family is "ethnocentric" and that what in Europe we call “ethnic minority” families, live and enact daily family life in different spaces to the idealised dominant pattern. All across Europe the historical effects of postcolonial migration, the surge of refugees and the economically motivated movement of peoples due to globalisation have together created a situation where the older and national vision of the family is significantly transformed by these structural factors.

This means that who might comprise the household of a family with children cannot now be imagined with the same certainty as in the last century by policymakers or advertisers.

Equally how the family is supported financially, where it now is likely to live and how it spends its time – especially time which traditionally might have been spent "as a family" - is far more varied than it used to be. This is particularly the case in respect of the growth in female employment which, coupled with the rising costs of childcare across Europe and the decline of stable and secure "jobs for life", has created a new kind of settlement in the relationship between work and family. Globalisation has created a new kind of competition for jobs (Brown, Lauder, & Ashton, 2011) and radical shifts in the decline of the large company or firm with the growth of outsourcing and agency work (Weil, 2014), coupled with the decline of manufacturing and the growth of the service economy (Mason, 2015), has shifted support for younger workers – and thus younger families – in ways that previous generations did not have to deal with. Increasing precarity and the significant decline of state support in terms of welfare provision and tax benefits for young families have created a set of circumstances which often means children are parented by single adults in serial fashion, in households with fewer children and by a range of adults, often as a contracted service, such as child-minders. The state frequently plays a different role as regulator and guarantor of these services rather than redistributing resources to support traditional family life as it did in the past.

The third key element in this structural reorganisation of family life is the scarcity of affordable housing across Europe. The number of young adults living with their parents is now at an all-time high and on average housing costs now represent at least 40% of average 1. In general, this problem is the key practical challenge to starting a family for young adults today and, combined with a unique period of high unemployment for the 18 to 25-year-old age range, seems to form part of an unequal distribution of wealth away from the young (Howker & Malik, 2013). The consequences of starting a family at an older age and of being dependent on one's own parents pose obvious challenges for family life and parenting.

In 2015, there are no real signs that these pressures on employment and housing will ease and that therefore the patterns of change that Deborah Chambers' observed in the variety of our intimate relationships will only continue to diversify and mutate (even allowing for the persistent historical inaccuracy in imagining that families were all of the same kind in the past). Other kinds of social change are also feeding into this re-conceptualisation of the family. For example, the increasing growth of large metropolitan areas (with its concomitant effect on housing), the effects of the current extraordinary refugee crisis, the growth of ethnic diversity in so many countries across Europe leading to in some places like London or Berlin,

[1] http://www.theguardian.com/world/2015/nov/19/damning-report-exposes-europes-escalating-housing-crisis>

the idea of intense "super diverse" populations (Vertovec, 2007) and the legalisation of gay and lesbian marriage even in traditionally conservative countries like Ireland will all continue to transform the institution of the family in ways that we can only just glimpse. As we continue to focus on the lives of young children and their learning, our changing norms and assumptions about how they are brought up and how they live their lives are going to be strenuously challenged and we need a research agenda that is sensitive to the directions of future change.

1.2 Digital Transformations

Some of the most obvious consequences of these kinds of structural changes lie in the supervision of, or looking after, children and the places where this care takes place. Nowhere is this more apparent than in young children's access to and use of digital technologies, which has both significantly altered the time spent by children by themselves and how they now grow up in a set of virtual relationships.

In Western childhoods, growing up in many households had often allowed for the solitary experience of reading books, comics and magazines (Luke, 1989). With the advent of television and, at the end of the last century, videogames, childhood became a more fraught space with debates raging about the use of the screen as a form of child-minding and children's early exposure to the "adult" world, as well as concerns about the way that even small children were constructed as objects by commercial interests (Buckingham, 2000; Livingstone, 2002; Kline, Dyer-Witheford, & Peuter, 2003).

In many cases, scholars argued anxiety about the impact of mass media was standing as a proxy for societies' difficulties in coming to terms with the changing nature of growing up in the current era. This has been most acute in concern with a screen that is connected to the Internet and furthermore not one that has just penetrated into the family living space but is

frequently a private and individual experience. Whilst early debates about the effect of television on the family were concerned with the shifting boundaries between the private and the public, the protected and the risky (Meyrowitz, 1985), now the concern is with the individualised nature of media use and the way that the child now stands in an even more immediate and direct relationship with the outside world.

These statistics about changing media use from analogue to digital as well as how that use is often central to children's everyday interactions with the world, do suggest a kind of sea-change in the way that children experience their lives in contrast with their previous generations. We know, for example, that over the last 10 years the amount of time 8- to 11-year-olds spend online has more than doubled to an average of around 11 hours a week in the United Kingdom[2]. The same age group spend nearly 15 hours a week watching television. Virtually 100% of children in the UK now have access to the Internet in their homes and up to 15% of 8-11-year-olds now have forms of connection which allow them to go online by themselves in their bedrooms.

Whilst scholarship in the last century theorised that the move from print to screen was almost as significant in the development of literacy as the invention of the printing press itself (Snyder, 1998; Snyder, 2002) so the move from the family focused television screen to the individualised phone or tablet interface has accelerated this research focus. And indeed, the use of such screens even amongst very young children is extraordinary. So in the United Kingdom again, over half of 3- to 4-year-olds used a tablet (such as an Apple iPad) in 2015 and a personally-owned tablet is now the device most often used for going online. Tablets are the second most popular device for watching television and computers are more likely to be used by older children (12+) probably more as a consequence of the need to do homework. This move to personalised screens has to an extent been mirrored by the popularity of smart phones. A quarter of 8- to 11-year-olds own their own smart phone and this seems likely to grow with the growth of the mobile Internet.

Our project is specifically concerned with younger children – younger than those covered by most research as in the paragraphs above – and the extent to which digital technologies have changed their childhoods is much more difficult to ascertain. In the UK, we know that pre-schoolers watch television, around 2 hours a day, and that most parents claim that this

[2] Data here and in subsequent paragraphs of this section are taken from <http://stakeholders.ofcom.org.uk/market-data-research/other/research-publications/childrens/children-parents-nov-15/>, unless otherwise indicated.

television watching is accompanied by an adult[3]. However, we also know that television watching is changing from public broadcasters to on-demand services, frequently on tablets, phones or computers, which inevitably raises the question as to whether this age group is increasingly targeted by commercial interests.

By the age of two most children are using a tablet or laptop and for those children aged under five who have access to tablets in the home, approximately a third of them own their own tablet (Marsh et al., 2015). The vast majority of children with access to tablets use them to watch TV programmes and video clips or to play games and use apps. Half of pre-schoolers use apps of some kind either on a smartphone or a tablet. More than one in three children under five are using mobile phones to access apps and games.

We know that data about this age group is hard to come by and findings, such as they are, have been significantly driven by commercial interests who focus on these markets which means at a European level there is much to know about non-commercially driven digital activities and the extent and range of such usage across the whole population. Knowing how such technology use now comprises core everyday activities for children is of course significant but it does not tell us what such engagement means in terms of the child's learning especially their entry into literacy and indeed the use of text, images, audio, video and gaming in general, their understanding of the world, their understanding of social relationships and indeed what implications such use might have for their education as a whole.

[3] Data here and in subsequent paragraphs from *Childwise Monitor Pre-school Report 2015* (www.childwise.co.uk) unless otherwise indicated.

1.3 Changing Childhoods: Consumption, Risk and Play

These changing patterns of media use and consumption, with the dominant trend being towards more individualised screen engagement, are part of a larger picture which has seen children's freedom being restricted. Although it's difficult to say whether these changing patterns are a cause or an effect of the mass media (Buckingham, 2000), we do know that children spend far less time in unsupervised outdoor play. Anxiety about safety on the streets, the decline of public parks and public spaces and the general change in attitude towards adult supervision of children have all supported a retreat from peer-led activity towards more solitary screen-based relationships (Lee, 2001; Corsaro, 2011).

Across Europe this has given rise to a set interrelated concerns. First, has been a concern about the commercialisation of childhood with the enormous growth of child -related marketing, especially in relationship to media driven products and their cross-platform availability from pyjamas to apps (Marsh & Bishop, 2014). The argument here is that children as independent agents and/or their families as responsible adults are in some ways vulnerable to the pressures of being constructed as consumers in a global marketplace. A key part of this has been the perception that "natural" patterns of play (formed in the historical moment of post-war childhoods, (James, 2012)) have been to some extent transformed by this cultural shift towards a common media culture (Jenkins & Fuller, 1995; Dyson, 1997; Willett, Richards, Marsh, Burn, & Bishop, 2013). As we will see in the section below, one proposed solution to this concern has been a new moral purpose for education.

The second set of concerns around changing childhoods relates to perceptions of risk and threat present in screen-based entertainment. At an ideological level this has been constructed in terms of failures of understanding and at a practical level in terms of increased and new threats in the online world – especially from paedophiles and pornography. Key to the perceptual problem is the extent to which young people have – or can be educated to have – a critical understanding of the truthfulness and accuracy of information online. In the UK, there seems to be general understanding amongst young people that behaviour online is not the same as the behaviour in real-life but on the other hand, children seem to be more likely to believe that information online is true[4]. At a European level, children now report being better able to protect themselves online in terms of being able to control privacy settings and awareness and understanding of threats as well as knowing how to seek redress and

[4] <http://stakeholders.ofcom.org.uk/market-data-research/other/research-publications/childrens/children-parents-nov-15/>

support[5]. The actual experiences of difficult or indeed dangerous threats online remain present across Europe, especially negative forms of user-generated content (hate, bullying et cetera). Much policy concern and political action has been directed towards questions of control and regulation in order to mitigate these threats partly because they might seem to be more susceptible to direct state intervention. On the other hand, supporting parents to know how to help their children and indeed to help children take control of some of these issues for themselves is, as we shall see, far more conceptually challenging and despite its evident importance, not necessarily something which many education systems have shown much imagination in dealing with.

Almost as a mirror image to the percentage of children who experience threat and unpleasantness online is the small proportion of children whose use of media could be described as creative and content producing. Earlier work by the EU Kids Online project had put forward the idea of a "ladder of opportunity" which suggested graduated progressions from every day media use leading towards more intensive, purposeful, creative production[6]. Whilst these kinds of activities which suggests new possibilities for young people's agency in communicative and civic domains remain intrinsic to some of the educational aspirations around new media use, actual day-to-day of the sort still remain in the minority and of course are virtually non-existent for the youngest age group. In reality then, much public debate is preoccupied by questions of vulnerabilities by both children and parents and the apparent need for state intervention and control in respect of this explosion of new media use by children in the family. At the same time, this is accompanied by a lament for a vision of a lost childhood where kinds of outdoor natural and spontaneous play appear to be lost in the digital metropolis.

[5] Data here about the European context are taken from: Livingstone, S., Mascheroni, G., Ólafsson, K., and Haddon, L., (2014) *Children's online risks and opportunities: Comparative findings from EU Kids Online and Net Children Go Mobile.* London: London School of Economics and Political Science available at <www.eukidsonline.net >

[6] <http://www2.lse.ac.uk/media@lse/research/ EUKidsOnline/EU%20Kids%20II%20(2009-11)/ EUKidsOnlineIIReports/Final%20report.pdf>

1.4 The Growth of the Schooled Society

All of these changes in the contexts where children are born and grow up and the kinds of childhoods they now inhabit are profoundly and immediately affected by societies' visions of and investments in, Education. A societies' understanding of school implies its theory of learning (Bruner, 1996; Levinson, Foley, & Holland, 1996) and this has an enormous impact on the expectations and norms that parents and children enact every day as they go about all sorts of activities in the home and with each other. All parents, whether they know it or not, deploy a theory of child-rearing in the family, yet older more traditional intergenerational notions of how children learn are, like the nature of childhood itself, under stress. Two trends have a particular influence on the uncertain value of digital technologies in young children's lives. The first is very broad and refers to a change on how Western societies are, it is argued, moving in societal terms, towards the pedagogicization of everyday life (Bernstein, 2000; Tyler, 2004; Moore, Arnot, Beck, & Daniels, 2009) or the schooled society (Baker, 2014); and the second relates to changing literacies, partly as a consequence of digitisation (Cazden et al., 1996).

The first of these trends – the schooled society - encompasses two themes. The first relates to the increasing decline in the value of middle-class employment described in 1.1 above and the competitive value of forms of accreditation from high school to tertiary education. It is now increasingly impossible right across Europe not to be educated and to be employable in ways that are fundamentally different from the past. Europe has consistently been at the forefront of moves to ensure equal and comparable standards across European countries and to push for and increase in investment in education systems in order to improve the potential value of future workers. At the same time across Europe, the public school system has been under a new kind of stress, partly as a consequence of the decline in money for schools, partly as a consequence of the kinds of rearrangements in employment and indeed the very role of the nation state itself, and partly because of the emergence of the so-called "knowledge society", itself indistinguishable from the transformative effects of digital technology we have just discussed in 1.3 above. (Ball, 2008; Biesta, 2011). The citizens who will inherit the knowledge society will not only need to be highly educated, they will need to be flexible and mobile in order to drive the industries of the future (Florida, 2002; Thomas & Brown, 2011). One key effect of these pressures is on the way that small children grow up is the "curricularisation of leisure" (Buckingham & Scanlon, 2002), how forms of entertainment, play and even supposedly free time for young children have now been scrutinised, packaged and sold (Seiter, 2005) as in some ways helping the child to get ahead and to compete in this uncertain and increasingly scary world. Studies of the way that parents now bring up

their children show how this pressure to succeed in educational terms leads to what has been called, "concerted cultivation"(Lareau, 2011) as families invest in their children with a view to their future "success".

One common feature of school systems around the world has been a renewed focus on changing the governance and funding of schools, and a move towards standardised testing and measurable outcomes, in addition to the growth of core curricula often euphemistically summed up in an interest in the OECD's PISA tests and scores. Although these kinds of popular policies have been subject to rigorous critique (Glass, 2008)[7], the gradual penetration of academic forms of knowledge and their acceptance as in some ways being even more important than ever can be seen in the tendency in the UK to promote forms of testing for 3- to 4-year-olds. We would want to note that this kind of development is uneven across Europe and certainly in Scandinavia, where there is a greater tenacity to hold onto the value of older traditions with their view of the value of unfettered play, and where children do not start school until much later than in some other countries across Europe. Nevertheless, very young children, even those defined as "preschool", are now subject to measurement, scrutiny and stratification in the schooled society

The second key trend affecting the use and understanding of digital technologies in young children's lives relates to controversy about the changing nature of literacy – or literacies – as the authors of this report would have it, across society. Although the "schooled society", as just noted, tends to reinforce traditional skills and especially use of competence in print literacy as a key indicator of what it means to be educated, this is somewhat of a paradox in an era reliant on digital devices both in the home and even with one eye on forms of communication and activity in the knowledge society. In the following section, we move on to consider the nature of literacy in a digital age.

[7] See also, Carnoy, M. (2015). I*nternational Test Score Comparisons and Educational Policy: A Review of the Critiques.* Boulder, CO: National Education Policy Center. Retrieved from http://nepc.colorado.edu/publication/international-test-scores.

2

Literacy in a Digital Age

Whilst it can be argued that communication has always been multimodal throughout the history of human culture, from early cave paintings, engravings on tools and embodied social and cultural practices (Lewis-Williams, 2002), the affordances of contemporary digital devices call into question the previously taken-for-granted dominance of language in everyday communication, and are reconfiguring meaning-making and literate practice as multimodal, multimedia and multi-sensory. Furthermore, the increasing mobility of technologies such as smart phones, tablets and wearable technologies has led to digital and multimodal texts being produced and read across a range of spaces and shared amongst a variety of local and distant networks.

Digital technology is re-shaping young children's early experiences of literacy as requiring mastery across a range of modes (such as words, images and sound) with a variety of literacy tools, both traditional and digital, from their first months of life. Comparatively little is known about the potential of digital, personalised, multi-sensory or mobile devices for early learning, about the challenges of online navigation for young children, their critical awareness and evaluation of online spaces, or their ability to identify the persuasive intent of commercial and entertainment-oriented rather than overtly 'educational' texts, amongst many other issues that are key to literate practice in the digital age. We know that for young children, success in literacy and learning pivots on the amount and quality of talk, interaction, and mentoring they receive from adults and peers, and this is often associated with activity around print, particularly the enjoyment of shared book reading. Similarly with digital media, talking and interacting with adults early in life is crucial for promoting critical thinking, making ties to content knowledge and the world, problem solving, and innovative thinking (Gee and Hayes 2011). Given that the ability to read, write, and communicate online will have a profound impact on all children's futures (International Reading Association 2001), we would argue for the need to develop robust theoretical and analytic frameworks to underpin research into young children's digital and multimodal literacy practices.

The shift to digital technologies, the diversity of the current textual landscape, the changing social and cultural landscapes, and concerns about contemporary childhood, as outlined in Section One, present new challenges for education theory and how theory can be used to inform policy and practice. Key questions include: how to define and delineate literacy in the

digital era; how to study and analyse the range of multimodal texts that characterise digital environments; how digital texts are created and interpreted; and how the features of the surrounding social and the material environment shape contemporary literacy texts and practices.

To date, policy discourses and curricula across Europe have tended towards an autonomous (Street, 1995) framing of digital literacy, focusing on equipping children with a uniform and universalist set of technical and functional skills to familiarise them with digital devices, and to enable them to begin to read and write in digital media. There has been a similar focus on the need to launch initiatives that will 'upskill' educators, parents and carers so they in turn can enable young children to develop their own digital literacy competences. This skills-based approach to literacy teaching and learning is based primarily on theories of language acquisition, and whilst language is indeed an essential aspect of literacy development, 'language is no longer the only or even the central semiotic mode' (Kress, 2010, p153). Language theories alone are no longer sufficient to describe or explain the many different modes, and the interrelationships between them, that characterise contemporary literacy practices with digital media.

2.1 Theorising Digital Literacies for Young Learners

Alternative approaches to contemporary literacy are offered by work in the field of New Literacies Studies (NLS) (e.g. Street, 1984; Hamilton, Barton, and Ivanic, 1994) where the plural 'Literacies' is used, rather than the singular 'Literacy', to recognise the broad range of practices that can be characterised as literate activity. From this perspective, literacies emerge in social and cultural practices and are 'ideological', that is, they are deeply enmeshed with 'thinking about, doing and reading in cultural contexts' (Street 2001, p11). The contexts of interest for NLS therefore extend beyond formal teaching environments, and include the vernacular practices that typify children and adults' everyday literacy lives. This makes way for the concept of 'emergent literacy', where young children's familiarity with literacy emerges through observation of and engagement in a range of literacy-related activities in different social domains (home, school, community, work), and in diverse networks of social practices. Children learn about literacy as part of everyday life, in family and community networks (Kress, 1997; Gregory, Long, and Volk, 2004), and in diverse 'literacy eco-systems' (Kenner, 2005).

A particular strand of NLS developed by The New London Group (1996) coined the now familiar term 'multiliteracies' in recognition of the inherently diverse and multimodal nature of literacy texts and practices across digital and non-digital environments (Cope and Kalantzis, 2000). Researchers in this field argued that the concept of multiliteracies 'overcomes the limitations of traditional approaches by emphasizing how negotiating the multiple linguistic and cultural differences in our society is central to the pragmatics of the working, civic and private lives of students' (NLS, 1996, p60). Multiliteracies studies have explored the relationship between classroom-based and everyday literacy practices, and include, amongst others, Maybin's (2007) analysis of young girls' formal and informal literacies and Dyson's (2003) study of the hybridisation of in- and out-of-school writing practices. Studies on the 'digital turn' (Mills, 2010) have investigated literacy practices in digital environments across social and cultural contexts (e.g. Lankshear and Knobel, 2008).

We have adopted the phrase 'digital literacy' to refer to the literacy practices of young children as they are undertaken across media. This is not unproblematic. Digital literacy has been adopted as a term used to refer to the digital competences children and adults may acquire through the use of digital technologies (e.g. JISC, 2014). Thus, it has, in Barton's (2007) framing, become a metaphorical term, as is the case with other phrases in which literacy is used as a signifier for skills and competence, such as 'computer literacy', information literacy' and so on. In addition, European research and policy has a long-established engagement with work in the field of 'media literacy'. How, then, can digital literacy be useful as a concept?

Digital literacy can be defined as a social practice that involves reading, writing and multimodal meaning-making through the use of a range of digital technologies. It describes literacy events and practices that involve digital technologies, but which may also involve non-digital practices. Thus digital literacy can cross online/ offline and material/ immaterial boundaries and, as a consequence, create complex communication trajectories across time and space (Leander and Sheehy, 2004; Burnett et al., 2014). Using 'reading' and 'writing' in their broadest terms, digital literacy can involve accessing, using and analysing texts in addition to their production and dissemination.

Digital literacy does involve the acquisition of skills, including traditional skills related to alphabetic print, but also skills related to accessing and using digital technologies. In this category might also be included skills related to the processes involved in accessing, using

and creating knowledge. In this sense, our understanding of digital literacy has synergies with those definitions that focus on competences. However, we must move beyond a focus on skills if we are to understand how children's digital literacy develops in a more holistic sense. To do this, we draw on Bill Green's 3D (1998) model of literacy.

Green (1998) originally developed his 3D model of literacy in an era when the focus was still largely on traditional print practices although recently, he has argued that the model can be adapted to include an emphasis on communication in a digital age (Green and Beavis, 2012). Green (1998) suggests that there are three elements involved in considering literacy as a social practice – the operational, cultural and critical. Operational elements include those skills needed to become a competent communicator, such as being able to decode and encode alphabetic print. Cultural competences include understanding literacy as a cultural practice and being able to read the cultural signs embodied in acts of meaning-making. The third element of the model, the critical, emphasises the need for critical engagement with texts and artefacts of all kinds, the need to ask questions about power, about intended audience and about reception. In this way, it shares many concerns of scholars engaged in work on media literacy (e.g. Buckingham, 2006; Livingstone, 2004).

If the 3D model is applied to digital literacy, then the three elements may be defined as outlined in Table 1:

Table 1: The operational, cultural and critical dimensions of digital literacy

Operational	The skills and competences required to read, write and make meaning in diverse media, utilising a range of modes. This includes: Decoding and encoding alphabetic print Understanding the affordances of, and being able to use effectively, a range of modes e.g. image, movement etc. Being able to operate digital technologies in order to engage in communicative/ meaning-making practices Knowing where and how to access information This is not an exhaustive list. The operational skills include skills that have been identified as significant to other metaphorical concepts of literacy, such as information literacy, computer literacy and media literacy.
Cultural	The cultural understandings and practices derived from engaging in digital literacy practices in specific social and cultural contexts.
Critical	The ability to engage critically with digital texts and artefacts, interrogating issues such as power and agency, representation and voice, authenticity and veracity.

The three dimensions do not operate in a linear manner, but inter-relate. More recently, Colvert (2015) has adapted the model of Green to identify the way in which the processes involved in meaning-making can be inflected by all three dimensions. Drawing on Kress and van Leeuwen (2001) and Burn and Durran (2007), she identified the following as key elements in the meaning-making process:

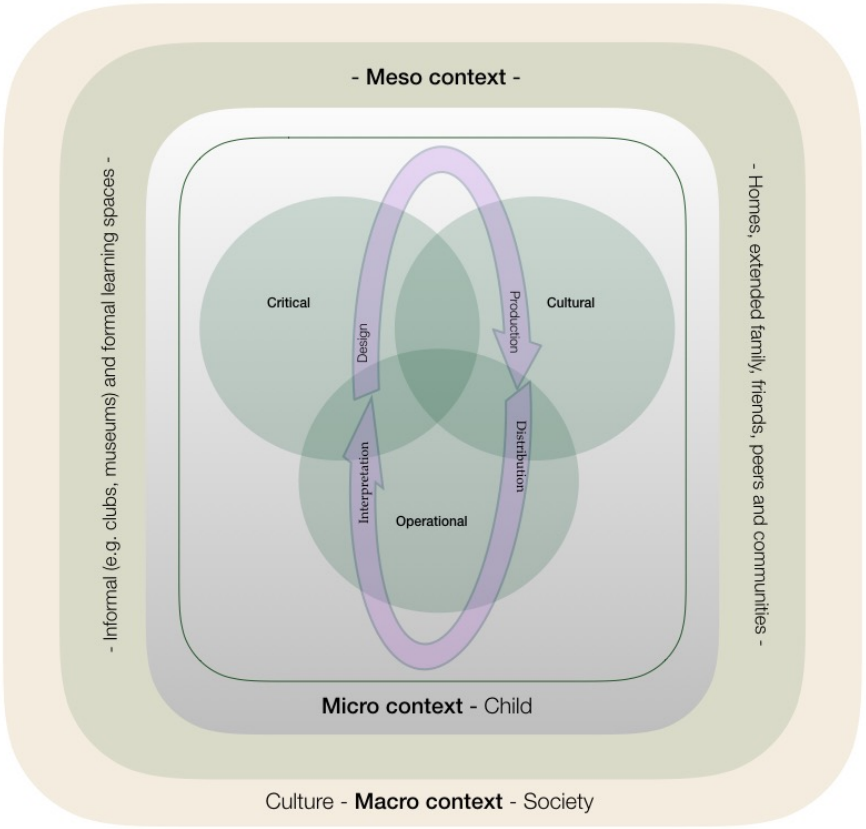
- Design
- Production
- Dissemination
- Reception

These processes are involved in text-making and reading/ viewing of all kinds, both within formal learnings spaces and in everyday life. These everyday processes might be explained by focusing on the actions of rhetors. A rhetor is an individual who wishes to communicate a message. The message can take the form of a text or artefact. It is important to acknowledge that a text can be defined very broadly – the term does not simply refer to written texts (Kress, 2010).

In the design stage, the modes in which the message will be conveyed are decided upon. In the production stage, the producer, who may or may not be the same person as the rhetor/ designer, creates the text/ artefact using the mode and media decided upon in the design stage. The producer may or may not meet all of the original intentions of the rhetor/ designer (Colvert, 2015). The message is then disseminated through the chosen media, for example paper, the internet, a combination of both, and so on. At the reception stage, the reader/ viewer engages with the text/ artefact and brings his or her own understandings to that process. At each of the 4 stages outlined by Colvert (design, production, dissemination and reception), the operational, cultural and critical dimensions of the 3D model are important. For example, in the design stage, the designer needs an understanding of what modes and media mean in a specific cultural context. The producer requires a range of operational skills if he or she is to create a text or artefact effectively. In the reception stage, the audience bring their own critical understandings to the text/ artefact. Thus, the original 3D model has been developed by Colvert to include these elements (see Colvert, 2015).

Colvert's model enables an understanding of digital literacy across all aspects – from the original intentions of the communicator to the reception of a text/ artefact. It offers a dynamic model, which moves beyond traditional conceptions of literacy as a linear process. However, these processes of meaning making take place within specific contexts, which also needs adding to the model. In Figure 1, we have added elements that frame children's engagement in digital literacy, informed by Bronfenbrennner's ecological model, to develop a framework for considering the context of young children's digital literacy practices at micro, meso and macro level.

Figure 1: The processes of, and contexts for, children's digital literacy practices (Adapted from Colvert, 2015)



First of all, at the micro level, is the child him or herself. He/she has interests, competences and so on that shape meaning-making practices. Identity is a significant aspect of digital literacy as a social practice and vectors of identity such as social class, language and ethnicity are also powerful in shaping literacy practices (Lewis, Enciso and Moje, 2007).

At the meso level, beyond the child, there are the wider influences of home, including parents and siblings, the community and society in which the child lives. At this meso level, we need to consider also the digital literacy practices that take place in both informal and formal learning spaces. In informal learning spaces, which are found in a range of sites such as clubs and museums, in addition to online affinity spaces (Gee, 2005), children engage in a range of digital meaning making practices. In classrooms, these digital practices can be framed tightly by wider educational policies. As the work of Dyson (2013; in press), indicates, classroom practice is shaped by teachers' intentions, by available resources and by the children themselves. The educational institution (early years settings/ schools) can also be a

powerful actor in this process, particularly if those institutions have policies and practices that inhibit or facilitate practitioners' designs with regard to digital literacy.

At a macro level, we can find the wider influences of the society, culture or nation state in which the previous practices take place. For example, schools themselves are informed by national educational policy, although the extent to which they conform to mandated policies differ (Hall, 2004). Home and community digital literacy practices are inflected by national approaches to technological infrastructure.

Whilst the nested models outlined in Figure 1 goes some way to explaining the impact of context on children's digital literacy practices, it is the case that this may appear to present a rather static model of the process. There has been critique of ecological models for this reason. Carrington (2013) argues that an ecological framework suggests balance and coherence, whereas use of technology is much more eclectic, fast-moving and multi-layered. She proposes, drawing on Deleuze and Guattari (1987: 4), the use of the term 'assemblages' to account for the poly-centricity and multi-layeredness of media supersystems:

> While an ecological framing looks to find a contributory role for all components, an assemblage has room for tension, mismatch and ongoing reconfiguration. There is not a sense of creating and then maintaining a balanced symbiosis of parts. As a result of this heterogeneity and independence, assemblages dismantle and reassemble in different combinations as context and requirements shift.
>
> (Carrington, 2013: 209)

If the concept of assemblage is applied to children's digital meaning-making practices, then we should recognise the messiness and complexity of literacy in a digital world. We would argue that Figure 1 also serves an additional function. As well as expanding traditional conceptualisations of literacy, it also offers a means of integrating previously quite separate understandings of literacy (in its metaphorical forms e.g. computer literacy, information literacy, media literacy). We would suggest that this offers a broad framework for conceptualising the operational, cultural and critical dimensions of diverse schooled and informal literacy practices, providing a theorised and growing research-evidence base for thinking beyond the focus on 'basic skills' that currently prevail in many EU literacy curricula and policy discourses.

2.2 Applying a Multimodal Analytic Gaze to Contemporary Literacy Practices

Given these changes to the semiotics and processes of communication in the digital era, a key task for educators and education researchers is to understand how young learners make sense of multimodal texts in digital environments, and how they impose order on the juxtaposition of different modes. We propose that multimodality offers a rigorous analytic framework for investigating how children learn to read multimodal texts, and how they use words, images and other semiotic and sensory modes when they learn to write.

Multimodality has been applied principally in the fields of NLS and multiliteracies research, but has also been adopted by researchers from wider disciplinary fields, across the Social Sciences, Arts, Humanities and Education (see Jewitt, 2014 for broader discussion). Three underlying theoretical premises for multimodality are that:

1. representation, communication and interaction draw on multiple modes, all of which contribute to meaning;
2. sets of semiotic resources (modes) are socially shaped over time to articulate individual, affective and social meanings;
3. people intentionally choose and configure modes to orchestrate meaning through multimodal design.

From this perspective, all communicational acts are viewed as multimodal, shaped by the norms and practices operating at the moment of sign making, and influenced by the motivations and interests of people in a specific social and cultural context. Building on Michael Halliday's social semiotic theories of how language is shaped by social context, central themes for multimodality have been the socially situated nature of meaning-making, and what motivates sign-makers to choose different modes to communicate and make meanings in given contexts (Kress and van Leeuwen, 1996, 2001; van Leeuwen, 2005). This interest in the social aspects of communication has led to the inclusion of sociological theory in multimodal research, including Bernstein, Bourdieu and Foucault. One of many examples of how these principles have been applied to printed texts include Bezemer and Kress' (2008) comparison of Science, Maths and English resources for secondary schools from the 1930s, 1980s and 2000s, where detailed multimodal analysis revealed how design and principles of composition in teacher-produced and web-based resources have over time

replaced writing as the central mode of representation in learning materials. Studies of young children's multimodal meaning-making include Flewitt's (2005) ethnographic studies of young learners' situated and intentional uses of diverse modes in face-to-face interactions, and in their engagement with digital media (2011), and Marsh's (2010) review of the central role of multimodal communication in young children's creative practices.

Historically, language has been viewed as the prime mode in meaning-making, with an assumption that the 'real' meanings lie in words, and any additional modes such as pictures are mere 'add-ons'. From a multimodal perspective, however, language is not the only or necessarily prime mode used for communication and representation: there are other socially and culturally shaped sets of semiotic resources that are regularly employed for making meaning, particularly (but not exclusively) in digital environments. These modes include, for example, static and moving image, sound, layout, touch (on page or screen); speech, gesture, gaze and posture (in embodied interaction). Just like language, how these modes are used by social actors is shaped over time through social and cultural practices, in particular communities where there is shared understanding of the semiotic (sign-making) characteristics of modes. From a multimodal perspective, all modes (including language) are conceptualised as fluid and subject to slow processes of change within particular communities, and there are acknowledged regularities about how they are used within any one community. Many readers may recall how personal computers in the 1980s used the programming language Disk Operating System (DOS) which followed the logic of language syntax - but technology has moved on a long way since users had to type encoded DOS commands to prompt a computer. Less than a decade later, computers shifted towards graphical user interface (GUI), which allowed users to interact with digital devices through graphical icons and visual indicators, as opposed to text-based prompts and interfaces. In the current era of miniaturised devices, icons have become widely used and easily recognisable semiotic resources that are well suited to screen display. Visual modes are highly efficient ways to convey meanings and are frequently used to symbolise hyperlinks to further digital resources, which in turn mean that readers are usually offered choices as to what to read, watch or listen to, when, and in what order.

The term 'multimodal' is sometimes confused with 'multimedia' – yet there are important differences. Whereas a mode is a semiotic resource or sign for conveying meaning, a medium is the material form that carries the sign (such as paper, stone, ink, digital screen etc). Media reflect socio-historical changes and technology developments in the processes of inscription, production and distribution. The printing press led to the widespread use of the medium of the printed word; the digital revolution led to the widespread use of the visual mode; the invention of touch-sensory screen technology is reconfiguring the role of touch in

sense making. Each medium affords different potentials and constraints for meaning making, and in so doing, makes an important contribution to meaning. So for example, a pen and paper lend themselves to writing by hand, perhaps adding a sketch or detailed drawing. A networked screen affords more modal possibilities, and the author of a digital text can usually select how to express a meaning from a large palette of modal options: words (Which font? Which size?); still images (WordArt, a personal photograph, an online image?); moving image (a Youtube clip, a personal video?); colour (which background or font colour, which shade?) etc. So the medium chosen to convey a message is also a cultural phenomenon: it is not simply a question of technology but of social and cultural practice, and how modes have come to be used in a given medium.

3

Digital Literacy in the Early Years and School Curriculum

From these perspectives, the task for educators is not simply to 'upskill' traditional literacy competences to digital media, but to recognise that the act of reading a text or producing a text in a digital medium can be profoundly different to the act of writing on paper or reading from a printed page. As Kress (2003) argues, in the post WWII era, the 'task of reading lay in interpretation and transformation of that which was clearly there and clearly organised' (p. 162). By contrast, digital screens (or indeed many highly illustrated books) are inherently multimodal environments, where the principles of making meaning shift from 'telling the world' to 'showing the world' (p. 140, italics in original). Unlike linear texts, in multimodal texts the pattern of reading from left to right (or whichever established reading path depending on the script system) is no longer strictly adhered to, and images, words and layout interact in complex ways. Reading multimodal texts therefore involves imposing order and relevance on what is presented, or, in Kress' words, reading has become a cognitive and communicative process of design (p. 50). Kress' metaphor of 'reading as design' (p. 50, italics in original) emphasizes the creative processes involved in interpreting multimodal texts, where the cognitive load for readers/learners involves making meaning in a way that makes sense and is significant for them at a given moment and for a particular purpose. Furthermore, in the current digital era, where information is readily accessible in online and networked storage systems, reading no longer centres on interpreting one particular text or limited range of textual sources, but involves navigating and making insightful and productive use of extensive resources in ways that are locally relevant (Mäkitalo et al. 2009). Thus the act of reading multimodal texts in digital environments is further complicated by the requirement for learners to be creatively and critically competent in finding and transforming information so that it becomes relevant for their specific purposes (Säljö, 2010).

The concept of digital literacy has surfaced in key policy documents on national, regional, and global levels during the last decade. However, as part of curricula issues the term has longer historic references since media literacy has been part of literacy and media research discourses since the 1980s, especially linked to media education (Tyner, 1998). With the introduction of digital media on a broad scale in our education systems since the end of the 1990s, it became evident that what we traditionally conceive as literacy and competencies of

reading and writing was not just confined to one medium, the book, but rather to a growing multitude of media and multimodal expressions.

The regional differences in the concepts used within this area are interesting because of differences in language and traditions, as well as the historic development of education systems. For example, in Norwegian curricula, the concept of literacy is not used. Rather, the concept of competence has been used in a broader sense of being able to interpret the world around you, including skills, knowledge, ethics, and cultural participation, as such avoiding positioning the discussion in line with the traditions of literacy.

Existing definitions and conceptions of media literacy and technology fluency have been related to certain frameworks and the development of standards for educational practices. In January 2001, the Educational Testing Service (ETS) assembled a panel to develop a workable framework for ICT Literacy. The outcome was the report 'Digital Transformation. A Framework for ICT Literacy' (ETS, 2002). Building on this document, one might, as the Australian authorities have done, define ICT-literacy as: "the ability of individuals to use ICT appropriately to access, manage, integrate and evaluate information, develop new understandings (create), and communicate with others in order to participate effectively in society" (Ainley et al., 2006).

Most of the key concepts in this definition are oriented towards information-handling. They also relate to the issues of problem-solving and self-regulation. This consists of more general competencies that are not connected to specific subjects in kindergarten, school or specific contents. They can be taught, and are not just related to what is learned in school settings, but also to situations outside of the kindergarten and school.

Ofcom, the independent regulator and competition authority for the UK communications industries, initiated several reviews on media and Internet literacy, defining it as "the ability to access, understand and create communications in a variety of contexts" (Buckingham et al., 2005, p. 2). This definition indicates different dimensions of technology literacy and fluency, with basic access as the first and foremost. Understanding includes both comprehension and critique, while creation includes both interaction with media and creation of media by the public (Livingstone et al., 2004).

This is also reflected in the recent large-scale international study measuring 'computer and information literacy' among 8th grade students in 21 countries. Computer and information literacy is defined as "an individual's ability to use computers to investigate, create and communicate in order to participate effectively at home, at school, in the workplace and in society" (Fraillon, Schulz, & Ainley, 2013, p. 17). Four different levels of complexity were developed in order to measure proficiency among students using digital technologies to solve authentic tasks. The results show that students in most countries show proficiency on simple tasks, but that most students had problems with more complex tasks. However, this study also illustrates the challenges of measuring digital literacy as isolated from other skills areas such as reading, self-regulated learning or evaluating sources across modes.

Other frameworks have used "digital competence" as an overall term. One example is the working group on "key competences" of the European Commission and their report "Key Competences for Lifelong Learning: a European Reference Framework." This framework identifies digital competence as one of the eight domains of key competences, defining it as:

> the confident and critical use of Information Society Technologies for work, leisure and communication. These competences are related to logical and critical thinking, to high-level information management skills and to well-developed communication skills. At the most basic level, ICT skills comprise the use of multi-media technology to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in networks via the Internet. (European Commission, 2006, p. 14)

Digital competence in this framework encompasses knowledge, skills, and attitudes related to these technologies. Several initiatives for these standards are now being developed around the world. They are defined as important tools for teachers in the way they use technologies in their educational practices. It is, however, important that these standards do not become static tests, but can relate to technological and cultural change processes.

In Norway, as one of the first countries in the world, digital competence was defined as one of five key competence areas of the national curriculum of 2006. This implies that is defined as important as reading, writing, numeracy and oral skills/competences, and is included inn al subjects on all levels of schooling.

Literate lives also refer to democracy and participation. In a society where digital technologies are having an impact on all aspects of social life, a question remains about how it might influence democratic processes, and what it means to be an informed citizen (e-citizenship). These perspectives are echoed by the Declaration of Principles of the World Summit on the Information Society (2003a):

> Each person should have the opportunity to acquire the necessary skills and knowledge in order to understand, participate actively in, and benefit fully from, the Information Society and the knowledge economy. … Awareness and literacy in ICTs are an essential foundation in this regard. (pp. 29, 31)

Issues of digital literacies are also part of what has become known as 21st- century skills. The international initiative and research network on "Assessment and Teaching of 21st Century Skills" (Griffin, McGaw, & Care, 2011), based on a meta-review of existing frameworks from around the world (Binkley, Erstad, Herman, Raizen, Ripley, Miller-Ricci, & Rumble, 2012) defined 10 core skills of importance in the 21st century, grouped into four areas. These are:

Ways of Thinking

1. Creativity and innovation
2. Critical thinking, problem solving, decision making
3. Learning to learn, Metacognition

Ways of Working

4. Communication
5. Collaboration (teamwork)

Tools for Working

6. Information literacy
7. ICT literacy

Living in the World

8. Citizenship—local and global
9. Life and career
10. Personal & social responsibility—including cultural awareness and competence

These skills and competencies are much broader than former technology-oriented frameworks, indicating that information and ICT literacy are part of broader life skills.

From the above, we can see that what exactly should be included within the conceptual domain of digital literacy has become increasingly fuzzy, especially among those educators and researchers whose professional interests emanate from that term. This, of course, is due to the fact that literacy is not a static term, but relates to technological innovations, as well as cultural and political strategies and developments.

There is a real danger today that both policy makers and research initiatives see “digital literacy” as just being able to use the technology in school-based learning, as shown by different initiatives of developing standards for media and digital literacy. If using computers in kindergartens and schools are only seen as a skill and cognitive tool, the appreciation of how these tools can enhance learning will not be taken up by the students. It is important, therefore, to consider the way in which digital literacy includes operational, cultural and critical dimensions (see Figure 1 in this paper).

4

Our Agenda

This review of the social and educational contexts and the theoretical frameworks that underpin them provides the background for the work the COST Action intends to undertake. We have an ambitious agenda that is informed by the urgent need to develop understanding in an area of research that has, hitherto, been under-developed. Our research questions are focused in five key areas. Collectively, these research questions will enable the Action to address its main objective, which is to advance understanding of young children´s digital literacy and multimodal practices in the new media age and build a co-ordinated European agenda for future research in this area.

4.1 Research Questions

We have described a social world in which very small children are using screens, internet enabled devices and enjoying texts that are profoundly multi-modal. They use audio, video, graphics, images as well as screen-based-text (in addition to paper-based print literacy) and the new medium of the 21st-century, games and gaming. But how and in what ways can we characterise and understand this? What does it mean in terms of how children learn and what they need to be taught?

We have argued that new literacies, multiliteracies and multimodality offer the best and most useful approaches to making sense of this new and fast-changing communications landscape, but at the same time our first key research question has to challenge our ourselves as it asks: What theories are most useful to explain change and continuity in children's literacies? What kinds of new ideas and concepts and from what intellectual tradition do we need to be able to explain these new literacies?

Many young children are immersed in this digital world from birth, yet, as yet, little is known about the ways in which they develop 'emergent digital literacy' (Marsh, 2015) in homes and communities. Thus, our second key research question is: What are the digital literacy

practices of young children in homes and communities and how do families and communities shape children's experiences?

We have argued that Literacy – and literacies - are not just a question of making meaning from text based forms of communication: they are not just neutral technical processes, they also frame power and the social order. It is impossible to separate digital literacy from education and so our third key research question examines the relationship of schooling to the new digital communications order. It asks: How (and why) do education systems define and measure literacy and/or literacies and what constitutes best practice with regard to the teaching and learning of digital literacy in early years settings and primary schools?

Children do not just learn about their world through formal education, however. A range of informal and non-formal learning spaces shape young children's engagement with digital literacy, both online and offline. Institutions such as museums and galleries are increasingly engaging young children and their families and children learn from peers as they interact in online affinity spaces. These are under-researched areas in relation to children aged from birth to eight. Therefore, our fourth key research question is: What is the role of informal learning spaces in shaping children's digital literacy practices?

There is now a range of evidence that points to the way that, for contemporary children, online and offline boundaries are fluid as their play and literacy practices cross physical and 'virtual' and material and immaterial domains in fluid and dynamic ways (Burnett et al., 2015; Marsh et al., 2015). However, there is still much to understand about what this relationship looks like and means in terms of broader cultural practices. Our fourth key research question thus asks: What are the implications of the increasing integration of the online and offline domains for young children's digital literacy practices and understandings?

Finally, we recognise that there are methodological challenges when conducting research with children aged under eight. Tools and approaches used with other age groups simply won't work when researching with children who are babies or in the early stages of acquiring language. Whilst much progress has been made in terms of understanding children's rights to actively participate in research, there is still much work to be done to engage appropriately with issues of voice, agency and representation. This leads to our final key research question: What methodological approaches can most effectively be utilised when researching young children's digital literacy practices?

4.2 The COST Action

The Action is bringing together a multidisciplinary network of doctoral students, early career researchers and experienced researchers across Europe to link current knowledge about the digital literacy and multimodal practices of young children aged from birth to eight years. There are currently 33 COST countries involved in this Action. Network events will take place across North, South, East and West Europe, as well as in larger and smaller countries, to ensure inclusivity. Stakeholders are involved in the network, including policymakers, teacher educators, early years practitioners, parent groups and children's media industry partners. There are numerous potential benefits of the Action across the scientific field and in terms of meeting European economic and societal needs.

Scientific benefits include the development of a strong knowledge base of current research in the area and a common agenda for future research. The Action will lead to interdisciplinary areas of study being developed, which will inform future research in the field. The Action will also develop theoretical frameworks which can be used to understand the fast-changing nature of reading and writing in a digital age, building on sociocultural understandings of early literacy learning, theories of multimodality and work in the field of media literacy. Formulating a European-wide framework and methods for future research in early childhood is much needed and the Action will facilitate this.

The Action has clear societal and economic benefits, which include creating an evidence-based platform for young European citizens to develop skills, knowledge and understanding that will enable them to become competent readers and writers of digital texts if they are to enter and perform well in employment markets of the future. In addition, it will inform an understanding of how to ensure children become critically engaged and responsible citizens, ultimately able to enhance their life chances. The Action will extend understanding of the complexity of literacy learning for young children in the digital age and how parents, caregivers, educational practitioners and communities can support them, with guidance on best practices provided on the project website. The Action will inform government policies on issues relating to internet safety, family digital literacy and early childhood education.

The Action will use the knowledge gained about digital and multimodal literacy practices to inform the development of curricula and pedagogy in early years education across COST

countries, by identifying current best practice in kindergartens, early years settings and schools and by sustaining an active dialogue with relevant practitioner audiences and forums. The Action will also inform understandings of culture, for example, the role of digital technologies in accessing cultural heritage, and how young children's cultural lives can be fostered through the use of new media. Issues of creativity and inclusion are also significant i.e. how young children from diverse linguistic, social, cultural and ethnic backgrounds are left out or fast-streamed into digital literacy practices. Good practice guidance in fostering young children's creativity in an inclusive manner through innovative uses of digital media will be developed.

5

Conclusion

Whilst the main aim of this COST Action is to identify a European agenda for research on the digital literacy practices of young children, this work is undertaken within an international context. There has been a range of research in this area completed across the globe, research that can inform the task at hand, but it remains the case that there is currently an in-balance in that much of this work has been done in the Global North, that includes North America, parts of Asia and Australia. One of the additional challenges, therefore, is to reach out to also develop partnerships with individuals, institutions and organisations that are working in the Global South.

A further ambition is to develop strong links with the children's media and cultural industries. One of the ways in which greater understandings can develop of young children's digital literacy practices is through enhanced collaboration between academics and industry partnerships. Both of these parties have specific knowledge and expertise to bring to the shared aim of furthering knowledge in the area.

The importance of establishing partnerships and networks to address key questions about young children's engagement with digital technologies is paramount; single individuals, or even institutions, cannot do very much alone. In addition, the kinds of research questions we aim to address can only be explored through an inter-disciplinary network, such as the one fostered by this COST Action, which has academics involved from a range of social science and humanities disciplines. We aim to engage in scholarly endeavour over the next few years to further understanding of some of the themes outlined in this White Paper and will offer numerous opportunities for others to join us in that task – please keep up-to-date with the Action website to keep informed.

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